2013

The actiotope model of giftedness: A short introduction to some central theoretical assumptions

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Abstract

Scenario 1: Favela Rocinha in the south of Rio de Janeiro. Little Carlos is sitting on three piled-up tyres. The four chairs around the only table in the wooden hut are occupied by his oldest brother and his friend playing cards together. Scenario 2: 155th street, Holocombe Rucker Playground, in the middle of a neighborhood in the poorest part of Harlem. Mike, aged eight, is dreaming of doing one 'slam dunk' after another some day during the 'Rucker', the world's most famous street basketball tournament. Scenario 3: The room of Lian, a third-grade pupil. She's going to do a mathematics test in two weeks, but cannot decide if she should start studying or watch a TV show which is very popular among her classmates.

It may seem unlikely to us that Carlos is going to be a professional card player, that Mike is going to be a professional basketball player or that Lian is going to be a great mathematician. But how could this scenario change?

Keywords

theoretical, assumptions, central, actiotope, introduction, short, giftedness, model

Disciplines

Education | Social and Behavioral Sciences

Publication Details

Ziegler, A., Vialle, W. & Wimmer, B. (2013). The actiotope model of giftedness: A short introduction to some central theoretical assumptions. In S. N. Phillipson, H. Stoeger & A. Ziegler (Eds.), Exceptionality in East Asia (pp. 1-17). London: Routledge.

THE ACTIOTOPE MODEL OF GIFTEDNESS A SHORT INTRODUCTION TO SOME CENTRAL THEORETICAL ASSUMPTIONS

Albert Ziegler, Wilma Vialle and Bastian Wimmer

1. INTRODUCTION

> Scenario 1: Favela Rocinha in the south of Rio de Janeiro. Little Carlos is sitting on three piled-up tires. The four chairs around the only table in the wooden hut are occupied by his oldest brother and his friend playing cards together.
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> Scenario 2: 155th street, Holocombe Rucker Playground, in the middle of a neighborhood in the poorest part of Harlem. Mike, aged 8 years old, is dreaming of doing one 'slam dunk' after another some day during the 'Rucker', the world's most famous street basketball tournament.
>
> Scenario 3: The room of Lian, a 3rd grade pupil. She's going to do a mathematics test in two weeks, but cannot decide if she should start studying or instead watch a TV show which is very popular among her classmates.

These are three scenarios, representing three totally different worlds of actions and opportunities for personal development. It may seem unlikely to us that Carlos is going to be a professional card player, that Mike is going to be a professional basketball player or that Lian is going to be a great mathematician. But under which conditions could Carlos become a brilliant card player, Mike a professional basketball player, or Lian an excellent mathematician?

Conventional models of talent propose that the key to answering this question lies in the special personality traits of the three children. These models label them talents, gifts, abilities, and so on (Shavinina, 2009; Sternberg & Davidson, 2005). By contrast, the Actiotope Model of Giftedness emphasizes the dynamic interaction of individuals with the environment. The focus of interest under the Actiotope Model, then, are actions not traits.

2. EFFECTIVE ACTION REPERTOIRES

All humans have a different repertoire of actions — that is, the possibilities for acting — which they could realize in principle. Carlos, for example, can play cards in a very sophisticated way for a boy of his age. Mike scores the most points with a basketball compared to his friends and Lian masters arithmetical operations that would normally be expected of children two years older than her. Although these three youngsters show remarkable performance in special fields for their age, their repertoire of actions is not comparable to the repertoire of actions of an expert in his or her special field. Experts have a far more effective repertoire of actions, which differs on at least nine characteristics from the repertoires of actions of Carlos, Mike or Lian (Ericsson, 1998; Ericsson, Charness, Feltovich, & Hoffman, 2006). These nine characteristics comprise the following.

The repertoire of actions of experts in their specialty includes actions that are more successful. A professional musician who is asked to play a new track will immediately find a much better interpretation than a good amateur musician. Similarly, Grand Masters of chess who analyze chess patterns, find much stronger turns than does a novice chess player. Mathematics professors can solve complex equation systems with ease, which the average person finds very difficult to understand.

The repertoire of actions of experts in their specialty is far more extensive. Chess masters, for example, have as many useful turns saved in their minds as there are words in their native language.

Experts act on the basis of rich information storage. Experts record more items of information, recognize the diverse relationships among them, and save those items in a more structured manner. When presented with the same problem in physics, for example, experts in physics and novices in physics perceive the problem in different ways. The perception of the experts is far more functional toward finding a solution.

Access to effective actions. Experts have sophisticated strategies, enabling them to retrieve successful actions and solutions to problems more quickly and in a more targeted manner. By contrast, the novice has access to poor choices along with possibilities for success. If you have managed to ride a bike without falling off, for example, it is not guaranteed that the next time you ride a bike will also be free of accidents.

Analysis of problems. Before experts act, they analyze the problem extensively and create a more action-functional problem representation than does a novice.

Physical adaptations. The bodies of experts are adjusted in many ways to the requirements of their domain. To illustrate, this applies to the different muscular systems of weightlifters, table tennis players and Radiologists and also to the specialized regions of their brains, enlarged in connection to their activities.

Introspection. Experts use more suitable strategies to arrive at a solution. Physicians, for example, who demonstrate excellent performance start with the given information and work their way through to the solution of the problem. Students of physics, however, typically reverse this process and try to work their way from the unknown backwards to the given information.

Cognitive effort. Experts have automated an enormous number of cognitive action steps. They do not have to be laboriously constructed in order to solve a problem, but can simply be retrieved. Consequently, cognitive resources are available for the analysis of aspects of problems, whose solutions are unknown at this point.

Taken together, these characteristics explain why experts, with their effective repertoire of actions, are superior to the average capable person in their special field. Carlos, Mike and Lian, in seeking expertise, may find it illuminating to reflect on how these findings can explain the difference between average and eminent level performance for card players, basketball players and mathematicians. However, these findings do not explain why some people are able to develop from an ordinary repertoire of actions to an extraordinarily effective repertoire of actions. Do talents and gifts actually play the critical role that conventional researchers of talents believe?

3. Intelligent Adaptations

If researchers of talents want to assess whether Carlos, Mike or Lian could ever build up an exceptionally effective repertoire of actions, they usually wish to ascertain whether these three children bring talents and gifts with them. In the Actiotope Model of Giftedness, this question is classified as less scientific. The question of whether all three can learn in an effective way, which enables them to build up an excellent repertoire of actions in card playing, basketball or mathematics, is what is asked instead. The answer is given within the scope of the systemic paradigm. The fundamental theoretical unit on which all analyses are based is the actiotope.

4. What is an Actiotope?

The focus of attention of the actiotope approach is actions and the possibilities for acting possessed by individuals. These are only understandable if we recognize them as a result of three adaptations:

- a biological assimilation that was mainly carried by the human species and is conceptually locatable in biotopes;
- a social assimilation that is mainly carried by social associations, which we can conceptually locate in sociotopes; and,
- an individual assimilation that is carried by individuals, which we can conceptually locate in actiotopes.

Essentially all actions, which are of interest in research on giftedness, are a result of these three adaptations. If Carlos puts a card on the table, for example, he does it with his hand (not with a fin or a wing), which is a consequence of biological adaptation (in biotopes). The card game itself and its rules are the results of a social adaptation (in sociotopes). The choice of particular card moves is a result of his individual adaptation (which happens in his actiotope). In a similar vein, all of Lian’s arithmetic skills are based upon enormous developments in the information processing of the vertebrates (in biotopes), the development of the mathematics discipline (in sociotopes), and the individual development of her arithmetic skills (in her actiotope).

In line with these introductory remarks, we can define an actiotope thus:

An actiotope includes an individual and the material, social and informational environment in which that individual actively interacts.

5. Three perspectives on the actiotope

Every actiotope is unique. In every actiotope, the individual can access a range of special possibilities for interacting with his or her environment. Every environment sets different conditions for success. When faced with a particular environment and the possibilities of learning, which that environment affords, individuals construct their repertoire of actions. That is why Carlos, Mike and Lian have very different repertoires of actions.

Repertoires of actions always have functionality that is unique to the actiotope in which the individual is currently acting. Hence, actiotopes are conceptual analytical units, in which the individual's acting and the possibilities of actions within the environment are integrated. Instead of single personal traits like talents or gifts, the actiotope approach examines individuals and their individual world of actions[1]. System theoretical considerations are significant from three perspectives:

- The component perspective (What are the elements of an actiotope and how do they interact?).
- The dynamic perspective (How do actiotopes change?).
- The system perspective (How do actiotopes remain stable, especially as they develop into excellence?).

6. COMPONENT PERSPECTIVE

All excellent actions show four characteristics. The action in question:

- is part of the repertoire of actions of the person;
- pursues an aim that seems reachable because of this action;
- is made possible because the situation was constituted in a way to allow this action; and,
- is selected because the person decided that the action was the most expedient in this situation from the repertoire of possible actions.

Based on this analysis of actions, the actiotope approach distinguishes four components:

1. The repertoire of actions is the total of individual possibilities of actions (e.g. first grade pupils typically can add and multiply in their heads, while fourth grade pupils can also calculate the same operations in a notational way. Hence, the latter's mathematical repertoire of actions is more comprehensive.).
2. Goals, which are targeted conditions of the physical or the social environment by the individual through actions (e.g. Learning targets, social aims, professional goals).
3. Environment — compared to the external environment of an individual (primary and secondary education, university, peers, parental home, media), the internal environmental share of the actiotope plays an especially important role.
4. Subjective Action Space, which are the possibilities of actions considered by the individual (to reach the aims, the most promising actions in this situation are chosen

[1] It should be noted that the Actiotope Model of Giftedness includes excellent groups. For reasons of space, we focus here only on individuals. The comments can be transferred mutatis mutandis also to excellence and the development of excellence in groups.

from the personal repertoire of actions, e.g. in a basketball match Mike may dribble around his opponent using the right instead of the left side; Carlos may try a bluff in his first card game for money when he has a bad set of cards; and, Lian may choose an indirect mathematical proof for a mathematical theorem).

As the bracketed examples suggest, the four components are not only involved in the accomplishment of excellent-performance actions, but are also constituents of *every* action. This applies especially for learning actions.

While points 1 (action repertoire, or what may be viewed as competencies) and 2 (goals) have been explored within the field of gifted education, the environment and the subjective space of actions have not received adequate theoretical examination. Since the latter will be part of another chapter (c.f. Stoeger & Ziegler, this volume), only the environment is elaborated further here.

7. A PROPOSAL TO ANALYSE ENVIRONMENT: SOCIOTOPES

To study the learning-efficiency of environments, Ziegler (2008, 2009; c.f. Reutlinger, 2010) suggested the construct of sociotopes. Sociotopes are relatively stable configurations of the environment, which exert stable influences on the actions of individuals. Spoken in system theoretical jargon, sociotopes are variables of control (Thelen & Smith, 2006).

Some conceptual preliminary remarks are important. First, sociotopes are understood as a framework condition of tangible actions. Second, they are conceived in a specific way in view of interesting learning aims. An environment may be a learning sociotope for playing football, but not for mathematics. Third, the relativity of sociotopes has to be considered, that is, the same spatial environment can be a totally different sociotope for different individuals.

A sociotope-concept, which fulfils these conditions, conceives environments not as a geographical area, but as a space of action for individuals. Thereby an objective and a normative space of action are distinguished in view of the interesting actions (Ziegler, 2011). The learning of Lian for mathematics should serve as an example. This case is concerned with actions in mathematics, which literally means that both objective and normative actions are conceived in view of mathematical actions (e.g. learning maths, doing a calculation, watching a movie about the life of a mathematician, talking about maths, and so on).

Under objective action space, the total of possibilities of actions is understood as those that can be theoretically executed by an individual in a given situation. Classrooms, train compartments, slopes, swimming pools, and so on, can offer these totally different objective spaces of actions.

Within the normative space of actions, every possible action from the point of view of the individual may either be desirable, undesirable or without any normative valence[2]. That implies the classification illustrated in table 1 (c.f. Ziegler, 2008, 2009).

[2] The division into three valences is a simplification made for didactic reasons. In fact, we assume that the valence can take a lot more values.

Table 1: Classification of a sociotope as an example of mathematics

Objective action space	Normative action space: actions in mathematics are…		
	estimated	not required	rejected
Allows for learning	Learning Sociotope	Infrastructural Sociotope	Avoiding Sociotope
Does not allow for learning	Thematic Sociotope	Competing Sociotope	Antagonistic Sociotope

In a learning sociotope, learning is possible and desired. Learning sociotopes can be a classroom during lessons, or completing homework at a desk at home. Additionally, it can include situations for learning outside the school context, such as extra-curricular music lessons, language courses, or sports training. These represent all the environments in which Lian's mathematical learning is desired. There is a good case to believe that she is in more of these mathematical learning sociotopes, than is Carlos or Mike. Those individuals would be more frequently in the learning sociotopes in which they could improve in card playing or basketball respectively.

Infrastructural sociotopes also allow performance gain and learning, but the accomplishment of learning actions is voluntary. Learning mathematics, for example, is something that Lian can also do on a park bench, during a bus or train ride, with an opened booklet at the breakfast table or by using mathematical knowledge offerings in the media. In Mike's case every backyard with a basketball hoop can be an infrastructural sociotope. A group of card playing friends, who do not play in order to improve, can be an infrastructural sociotope for Carlos.

In a sociotope of avoidance, learning is possible, but not desired. It is possible that Lian wants to use a recess break, spare time at school, or a day off from school to learn mathematics, but she encounters criticism from her classmates and/or her parents. She is then placed in the awkward situation of having to justify her wish to learn. Equally, Mike and his friends could be told to stop playing basketball by neighbors because of the noise. Carlos' father could prohibit his son and his friends from playing cards at home.

In a thematic sociotope, learning is not possible, but successful learning and performance gain are appreciated. When Lian is talked to about mathematics in a thematic sociotope, there is a positive undertone. She can have such conversations about mathematics with her parents who are also interested in mathematics, for example. Alternatively, the parents of Mike and Carlos, being more interested in basketball and card playing, are able to provide thematic sociotopes during a dinner conversation.

In competitive sociotopes, learning is impossible because other things are in the foreground. Examples are spare time activities like listening to music, watching TV or dancing. Thus, Lian, Mike and Carlos are not pursuing any learning goals while they undertake these activities.

Antagonistic sociotopes endanger learning, because they stigmatize learning as negative.

Examples are all situations in which learning is objectively not possible and is additionally depicted as negative. One example would be if, during a break, Lian's peers started to criticize mathematics and to mock those ambitious pupils who are interested in maths. For Mike and Carlos, this would occur if their parents asked them to spend less time on basketball and card playing respectively.

Altogether, analyses of sociotopes provide indications about which repertoires of actions individuals *can* build up in their environment and about the ones they *should* build up. They are the constraint of excellence-development.

8. Dynamic perspective

Whether Carlos, Mike and Lian can establish an effective repertoire of actions will mainly depend upon what learning opportunities they discover in their environment and how effectively they can use them. They will practice, learn and train years for this, until they can achieve excellence in their domain — and probably only there.

Their process of adaptation is dynamic, since Carlos, Mike and Lian constantly change, as does the environment in which they interact, during their acquisition of excellence. During her learning process, Lian may have shown extraordinary achievements in mathematics, such as completing simple calculation tasks in her head while still a preschooler, or systematically learning arithmetic in primary school and algebra in secondary school. She may have specialized at university in a special branch of mathematics, which she deepened by completing a doctorate at a foreign University. From her first involvement with mathematics to the attainment of performance excellence, her person, her environment, her learning objectives and her learning itself are subjected to a process of continual change.

This can be examined at two levels. At the micro level, we look at the individual learning period, that is, a singular expansion of the repertoire of actions. At the molar level, we analyze the sequence of learning episodes.

8.1. Micro perspective

The micro perspective focuses on a single episode of learning or a single step. This step can be considered completed if an individual has expanded his or her repertoire of actions to include an additional possibility to act *and* is able to use this new possibility successfully in the appropriate situation to achieve an appropriate target.

The question whether it is possible to identify characteristics of effective learning episodes is interesting. We argue that there are at least four, which can be called the 'big four of learning' because they all must be generally realized at successive more sophisticated learning steps (c.f. Grassinger, Porath & Ziegler, 2011).

Improvement-oriented learning means that simple engagement with issues rarely admits learning gains. Thus, performance and effort level off quite quickly in our daily lives. In concrete terms, this means that there is usually a very good compromise between the achievements we can still reach, without the need to expend too much energy in the process. Beyond this compromise, no further performance gains are targeted. This is a very useful process, which keeps us from persisting too long with areas in which we cannot succeed. On the other hand, people who strive for performance excellence, must be far more powerful than their social affinity group. If Lian wants to become an exceptional mathematician, it is not sufficient to be the best in her class. Nor should Mike be satisfied with being the best in his team or Carlos with being the best player in his neighborhood. Their engagement with their domain must always be with the aim to improve and to move their individual limit upward.

Optimal learning is based on the principle of *individualization*. Each individual learning-step must be tailored to the learner. In other words, every learning-step must entail an optimal use of the five forms of educational capital and of the five forms of learning capital, which we will describe below (see also Ziegler & Baker, this volume).

A step is rarely possible without appropriate feedback. The learner needs to know what he or she is still doing wrong and when the step is complete. This feedback can be generated through self-monitoring, but often professional help is needed. For example, Mike scoring a basket or Carlos winning a game do not necessarily provide the feedback that they have mastered a learning-step. For example, Mike may have scored the basket with a suboptimal technique, which could be damaging to his play if it becomes a habit. Equally, it may be that Carlos won his card game despite employing an incorrect strategy, because his opponents made errors in their play.

Both *practice* and *consolidation* are part of a successful learning-step. Usually a variety of exercises is necessary. This should require minimal transfer benefits, which means they must be solvable without the necessity for further steps of understanding. This principle – to give sufficient training opportunity in practice tasks with minimal transfer – has been applied successfully in learning musical instruments, in mathematics and in sport for centuries.

8.2. Molar perspective

The molar perspective focuses on the sequence of learning episodes, that is, specifically to the planning of individual trajectories that can lead to excellence. Such trajectories are known as learning pathways in the actiotope model of giftedness. In particular, an effective sequencing of learning episodes is important. Skill acquisition is the development of an effective repertoire of actions, which can be completed only through interaction with specific learning environments. These must be designed in line with the increasing skill levels of learners as they become increasingly professional. Ideal characteristics for different stages of excellence development are included in table 2.

Table 2: Ideal forms of actiotope components for different stages of the acquisition of expertise in a domain.

Component/ expertise State	Lay people	Beginners	Advanced levels of expertise	Experts
Repertoire of actions	No or only rudimentary domain-specific actions	Predominantly actions with positive quality of experience	Competent actions in a domain; numerous automated actions	Extremely extensive, highly effective, very elaborated, can be flexibly combined
Aims	No domain-related targets	Playful access, positive quality of experience (fun)	Performance improvement	Successful use of the Repertoire of actions
Environment	No or loose contact to the domain	Usual conditions of a hobby	Professional design of learning opportunities; trainers, mentors	Professional design for the purpose of expertise (e.g. auditions, performances, application of expertise in the profession)
Subjective action space	Domain-specific actions are not considered	Simplified subjective action spaces	Complex action spaces with increasingly more effective and more flexible action constructions	Complex action spaces and safe design and execution of performance excellent actions

9. THE SYSTEM PERSPECTIVE

Systems are stable configurations of interacting elements, which can be considered a meaningful and purposeful unit. If excellence is to be achieved, the actiotope of a person must undergo considerable modifications. How is excellence possible without it? Why did Carlos, Mike and Lian want to become better and why was this possible? Why did they not abandon their quest after one of the many setbacks that inevitably occur during the development of excellence? Why were they continually supported by mentors, coaches or friends, for example? What kind of support did they need?

For the assessment of the modifiability and stability of an actiotope, it must be remembered that the *current* actiotope of the students is the best solution they could find to achieve *their* goals in *their* environment for *their* actions. Of course, these solutions are, although objectively considered, rarely optimal solutions. However, we can assume that actiotopes are usually quite stable and changes often interfere with such states of equilibrium. Learning-steps, therefore, also have unintended changes, which can threaten the stability of the actiotope. To keep actiotopes on a learning pathway, many resources are necessary.

9.1. Resources: Educational Capital and Learning Capital

The idea that any change needs energy is a fundamental piece of scientific knowledge. On the basis of our systemic approach, we also assume that each step requires energy and resources. These resources are partly localized in the learner (i.e. endogenous resources) and partly outside of the learner (i.e. exogenous resources).

The regulation of endogenous resources is subject exclusively to the subsystem of 'person', but while exogenous resources can be used by the person, their provision usually depends on other systems (school, teacher, classmates, educational system, etc.). We equate exogenous resources with the term of educational capital, and endogenous resources with the term of learning capital. Because of the centrality of these forms of capital, a separate chapter is devoted to these in this book (see Ziegler & Baker, this volume). Here is just a summary.

9.1.1. Educational Capital

Educational capital refers to all external resources, which can be used to build up an effective repertoire of actions and are influenced not only by the person itself. Five forms are distinguished.

Economic educational capital includes all those possessions and valuables, which can be used for the initiation or continuation of learning episodes. For example, the amount of money assigned by various educational jurisdictions per student differs greatly (OECD, 2011). The numerous findings on the relationship between the socio-economic status of a family and a diverse range of developmental outcomes for children, both in the socio-emotional and cognitive realms, are another example of the importance of economic educational capital (Gienger, Petermann, & Petermann, 2008). To illustrate, if Lian would like to later study at an elite university to achieve excellence in mathematics, she may have to deploy considerable economic educational capital.

Cultural educational capital includes values, concepts and ways of thinking, which can promote or impede the development of an effective repertoire of actions. For example, there is currently a tremendous appreciation of learning at schools in various East Asian countries, which promotes the learning success of students in these countries in many ways (see various other chapters in this book). Further, groups of students can be identified that are remarkably poorly equipped with cultural educational capital. Girls in STEM (Sciences, technology, engineering, mathematics), who have to overcome a number of culturally-related obstacles in most countries before they can achieve excellence, are an example. Even today, STEM work is seen as a male domain, while girls and women are regarded as less suitable for these disciplines (c.f. Stöger, 2007; LIT).

Social educational capital includes all individuals and social institutions that have direct or indirect impact on the success of learning episodes. Research shows convincingly that the different availability of educational equity for students is in line with diverse educational and learning indicators (Goldin & Katz, 2008; Nonoyama-Tarumi, & Willms, 2010).

Infrastructural educational capital includes the material and policy options, which can be used in support of learning. These include, for example, school buildings, resource rooms at schools or school libraries.

Didactic educational capital is the available knowledge on the design and optimization of pedagogical approaches (c.f. Willms, 2006).

9.1.2. Learning Capital

Learning capital is what we call the endogenous resources that help students to build up a repertoire of effective activity. We distinguish five forms of learning capital.

Organismic learning capital refers to the physiological and constitutive resources of a learner. For example, the learning outcome depends directly on the physical (fitness) state in which it is learned.

Actional learning capital includes the complete repertoire of actions of a learner, or of which the learner is basically capable of utilizing. This includes cognitive activities (and thus, approximately, what is commonly referred to as knowledge). Examples include operations in mathematics lessons, movement sequences in sport, and also linguistic skills. Students with an immigrant background, for example, may be disadvantaged if they cannot execute all linguistic actions (language production, language comprehension, etc.) as desired.

Telic learning capital refers to the availability of functional objectives, which are related to learning processes. For example, students who are alienated from school, may have very few or, in extreme cases, no learning objectives.

Episodic learning capital represents the available aim- or situation-related patterns of actions for students. Simply expressed, it is the experience of students. Although episodic learning capital requires mandatory actional learning capital, there is one important difference. Actional learning capital corresponds to the generally available actions, while episodic capital includes only the effective possibilities of actions (see also Simons, Weinert & Ahrens, 1975). Thus, it is not sufficient to be able to perform a learning strategy; a student must know exactly how and when the strategy can be deployed successfully.

Attentional learning capital refers to the quantitative and qualitative attention resources available for learning. Quantitative attention resources, for example, are not as readily available when using a lot of time on leisure activities (e.g. for computer games or television). The quality of attention resources may be restricted if, for example, there is no appropriate quiet workplace at home for completing homework.

9.1.3. Educational and Learning Capital of Carlos, Mike and Lian – some examples

When we introduced the construct of sociotopes, we indicated that Carlos, Mike and Lian live in completely different worlds. However, not only are the sociotopes different, but also the given education and learning capital of this sociotope are. Mike may have many friends who think it’s great if he is good at basketball; and, maybe a neighbor would drive him to an away game at basketball. Thus, he has social capital in terms of the basketball game. However, his friends may not like it if he is good in mathematics (= negative social capital in mathematics) and, the neighbor may take him to an away game in basketball (positive social capital with regard to basketball) but not to a math lecture. In Mike's environment, there is an outdoor basketball court, but not a library where he could borrow math books like Lian. His infrastructural capital in terms of basketball is greater than is Lian’s, but is lower in terms of mathematics.

Carlos receives many tips from his playing partners on how he could improve his game. But these tips are not equally beneficial because the didactic educational capital of his partners are also different. Carlos, Mike and Lian, of course, also have completely different telic learning capital: Carlos likes card games, Mike likes basketball, and Lian enjoys mathematics. In a large part, their telic capital reflects the cultural capital that they found in their sociotopes. The friends of Carlos admire outstanding card players, Mike's friends admire basketball stars and for Lian’s parents it is important that she performs well at school, especially in mathematics. Card games and basketball, however, they reject.

If Mike suffered a blow, for example, and his telic learning capital was not sufficient to get to training, maybe one of his friends would intervene and build him up again (= social educational capital). If he has insufficient economic learning capital to buy new basketball shoes, a sponsor may intervene and provide them. These examples show that we are able to explain quite well, on the basis of the resources available in the actiotopes, what developments these three children can accomplish and whether they can overcome learning crises.

9.2. The principle of co-evolution

The principle of co-evolution is based on the understanding that there are no isolated behaviors or changes. The behavior of system elements is not localized, but always has an impact on the overall system. Feedback loops of various kinds are not an exception but the norm. However, changes entail concerted follow-up changes and consequences, allowing the further development of the actiotope to excellence. The effects, therefore, should not be sorted by chance, but must be arranged in a way that makes new learning processes possible. If a new playing technique has been successfully employed by Carlos in a card game, this does not only have consequences for his development of competence. There are additional, quite typical, reactions that may be observed. He responds with positive emotions, is motivated, his interest in the acquisition of new effective techniques increases, he is allowed to play with stronger card players where he can acquire new playing techniques, and so on.

For the analysis of modifiability and the analysis of stability, the principle of co-evolution of the components is critical to actiotopes (Ziegler, 2005). After a step is mastered, the extended repertoire of actions in the subjective action-space must be mapped. New goals can be achieved now and previously non-usable environmental conditions can be included in actions. Let us assume, for example, that Mike has expanded his repertoire of actions with a new way to pass his opponent. Various aspects of the posture of his opponent, which he had not previously observed, could now be the reason to use his extended repertoire of actions. To do this, he must set appropriate objectives (e.g. pass the opponent on the left, after deceiving his opponent with a quick look to the right to suggest he intended passing on the right). In his subjective action space, he must generate the best use of his possibilities of actions to successfully achieve his objectives, with exact observance of the reactions of the opponent. Of course, his plan could also go wrong. Based upon this experience, Mike can work specifically on his weaknesses. But this assumes that, in turn, he sets appropriate learning objectives, and generates clever possibilities of actions in his subjective space to achieve these new objectives in his environment, and so on. The behavior of his opponents is also affected by his extended repertoire of actions. With time they will adapt to his new technique, which then may be incentive for Mike to add yet new extensions to his repertoire of actions.

Considering the usual methods of assistance for gifted students (enrichment, acceleration, etc.), it would seem that all the components of actiotopes and the principle of co-evolution are only considered in exceptional cases. The hope, that everything will magically co-develop, is not very professional.

10. SUMMARY

This paper aimed to provide a practice-oriented introduction to the basic theoretical assumptions of the Actiotope model of Giftedness. As we have seen, it is concerned above all with the actions of an individual, where the achievement of excellence is interpreted as building a repertoire of highly effective actions. It is a domain-specific adaptation to the environmental conditions in the individual actiotope that is increasingly developed. We have introduced the component-perspective of the Actiotope model of Giftedness. In contrast to other conceptions of giftedness, four categories of system elements and their interactions are considered: the action space repertoire, objectives, the environment and the subjective action space.

Some readers may question why components that are typical of other models are missing. For example, our model does not include the words ‘talent’ or the ‘talented’, which may be identified on the basis of an IQ score or achievement (or a combination of both). Rather, we argue that achievement is a synonym for an effective repertoire of actions. This means that within a domain, the individual selects an effective action from a repertoire of actions, at the right moment in the pursuit of an objective. Thus, Carlos chooses the right game strategy, Mike hits the basketball hoop under stress, and Lian solves a mathematics task. In the Actiotope model of Giftedness the current effective actions are those of high interest.

The individual’s IQ can be interpreted as an indicator (but by no means as an explanation) of an effective repertoire of actions. This effective action repertoire addresses the shortcomings of an IQ test. IQ tests, as designed, represent a very good indicator of the effectiveness of the educational or academic repertoire of actions. This is the reason why such tasks in IQ tests are valid because their solutions correlate with school or academic accomplishments. To this extent, only, the IQ is partially suitable to predict (but not explain) the further construction of the academic repertoire of actions.

In a component analysis, it is important to consider effective actions (what can be understood through IQ tests, and somewhat more accurately through domain-specific achievement tests). However, it is equally important to analyze other components. For example, interest tests can be used for the measurement of objectives. The analysis of the environment can be done on the basis of the classification of the sociotope in which an individual is located. There are still no special methods for the measurement of subjective action space, but some considerations are introduced in Stoeger and Ziegler (this volume).

This consideration of components of actiotopes, however, is only a relatively static impression of its current status. If we look at the development of excellence, only one seems to be resistant, namely, change. Repertoire of actions, objectives, learning opportunities (as well as the everyday environment of learners), and the actions designed in the subjective space evolve dramatically. It is incumbent upon the dynamic perspective to analyze all of these changes, although there is a natural focus on the individual learning episodes (micro perspective) and its succession (molar perspective). However, the respective analyses require a considerable knowledge of domain-specific learning processes and their sequencing. This will usually require professionals. The next step in mediating the trajectory of Carlos may only be a card expert, of Mike a professional basketball coach, and of Lian a mathematics teacher. With increasing expertise, the learning processes are continually becoming more specialized. Nevertheless, we have used the big four of learning to explore four criteria for the design of a successful learning period.

The adaptations that Carlos, Mike and Lian will undertake next depend on how their current repertoire of actions is enunciated (because not any customization steps can be skipped), what objectives they hold at the time, how their environment is constituted (what learning opportunities it offers), and whether they manage to generate an effective action in the subjective space. Certainly a concordant interaction of the actiotope components is important, enabling the system to permanently display the desired behavior. This is the principle of co-evolution, that is, that actiotopes are to be modified, and that these significant changes over time, access each other harmoniously, otherwise the stability of the system is compromised. For example, it is not sufficient for Lian to set the goal to become better in mathematics. It may lead to an increase in her learning but such learning is not guaranteed unless her repertoire of actions contains the necessary learning and comprehension strategies. Lian's progress must be in line with the aforementioned principle of co-evolution. This would mean, in the case of Lian's example, that target formation, acquisition of the necessary learning, and understanding of the strategies would have to go hand in hand. Again, this is not sufficient in itself. The subjective action space must also be adjusted accordingly. Thus, the increased capabilities must be mapped in the concept of self-skills, thereby allowing more demanding objectives to be targeted in the subjective space of actions. It follows, then, that the new learning opportunities for the next step would have to be provided in the learning environment. This also means that Lian's mathematics teacher must recognize her higher competence level, in order to adjust the level of difficulty of the tasks or to give appropriate feedback. Accordingly, modifications must be very carefully planned with regard to the principle of co-evolution.

Finally, the question of which resources are required in the process of building an effective repertoire of actions, arises. For this purpose we have introduced the concepts of educational and learning capital. Here, the principle is "a chain breaks at its weakest link". In the planning of individual learning pathways for Carlos, Mike and Lian, care must be taken therefore, that these learning pathways are adequate and available at all times. Otherwise, the long chain of learning episodes, which is necessary to achieve excellence in a card game, in a basketball game, or in mathematics, would be damaged at some point.

To sum up, we want to highlight, that in this short introduction to the Actiotope model of Giftedness, excellence was a result of successful adaptations to environments (sociotopes), containing potent learning opportunities (i.e. ranges are equipped with domain-specific education and learning capital). Whether Carlos becomes a brilliant card player, whether Mike gets his breakthrough in basketball, or whether Lian becomes a great mathematician, is the result of a co-evolutionary process in which attention has to be paid to the stability of the system following any successful learning episodes. Performance excellence is achieved while the learner is immersed in a specific domain, but is decided in the entire living world of learners. From the perspective of the actiotope approach, therefore, insufficient learning orientation and insufficient life world orientation are the two main deficits in current models of gifted identification and gifted education.